

DOCKET NO.: 260740US0PCT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF:

Gerhard NESTLER, et al.

SERIAL NO.: 10/511,603 :

FILED: 11/03/2004 :

FOR: METHOD FOR PRODUCING LOW-ODOR HYDROGEL-FORMING POLYMERS

DECLARATION UNDER 37 C.F.R. §1.132

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

Now comes Dr. Rüdiger Funk who deposes and states:

1. I am a graduate of University of Mainz, and received my doctorate degree in polymer chemistry in the year 1987.
2. From 1987 to 1993, I worked as a research chemist for Cassella AG, Frankfurt, in the field of hydrophilic polymers, including superabsorbent polymers. From 1993 to 1997, I have worked as a technical expert in the field of superabsorbent polymers for Hoechst AG and Clariant GmbH. Since January 1999 I have been working for BASF AG as a manager for research and technical marketing of superabsorbent polymers. Therefore, I am fully conversant with the technical field to which the invention disclosed and claimed in application Serial No. 10/511,603 belongs.
3. I have read and fully understood U.S. application, Ser. No. 10/511,603.
4. I have studied the record of application Serial No. 10/511,603, in particular the Office Action of January 26, 2006, and the prior art applied by the Examiner, in particular the teaching

of Irie et al. (US 6,388,000).

5. It is my understanding that the Examiner still contends that the particular features of the process according to the claims of application Serial No. 10/511,603, are already known from Irie et al..

I cannot share the Examiner's position as set forth in the Office Action of January 26, 2006, for the following reasons. The teaching Irie et al. relates to a process for the preparation of acrylate polymers, in particular water absorbent resins having a crosslinked structure by polymerizing an aqueous solution containing partially neutralized acrylic acid and a crosslinking monomer. In col. 8 indicated lines 1 to 18 of US 6,388,000 it is stated that the monomers forming the crosslinked absorbent polymer do not contain more than 1000 ppm, preferably not more than 500 ppm and more preferably not more than 300 ppm of β -hydroxy propionic acid, based on the amount of solids (col. 8, indicated lines 10 to 15). In col. 8 indicated lines 19 to 31 of US 6,388,000 it is stated that a content of β -hydroxy propionic acid in the monomers exceeding 1000 ppm results in an unduly large residual monomer content in the obtained polymer and upon heat treatment of the formed polymer residual monomers are newly generated or the existing residual monomer content is increased. Irie et al. do not mention the content of acetic acid or propionic acid in the monomers used in the preparation of the absorbent polymers.

The Examiner's position that Irie et al. imply that the amount of acetic acid, propionic acid or combinations is 0 ppm, because Irie et al are silent on acetic acid, propionic acid or combinations thereof as impurities, is not deemed to be well taken.

Acrylic acid is a bulk chemical which is produced in an amount of more than 4 million tons per year (worldwide in 2005). Such bulk chemicals must be produced at low costs and a further purification of a bulk chemical will only be performed in those cases where it is absolutely necessary. Nobody will purify a bulk chemical without a extraordinary need, since

purification will dramatically increase the costs. If a certain impurity interferes with the intended use it will be removed at the less expensive manner. Any purification will be designed to remove only those impurities which must be removed to the extent which is required for the desired purpose. Therefore, acrylic acid will generally be used as it is, i. e. as it is obtained in the production process. If acrylic acid contains specific impurity which interferes with the subsequent use (such as stabilizers or β -hydroxypropionic acid) the measure would be designed in a manner that allows efficient removal at minimum costs of the specific impurity without giving much weight to other impurities that might be present.

Likewise water absorbent polymers are produced in an amount of about 1.3 million tons, globally. As the main constituent of most superabsorbent polymers is acrylic acid and its sodium salt, the costs of acrylic acid have a strong impact on the costs of superabsorbent polymers. The acrylic acid, which is used as a raw material in the production of acrylic acid based superabsorbent polymers, must meet a certain quality specification, since some of the impurities contained in acrylic acid might interfere with the polymerization process or result in unacceptable discoloration while others are unacceptable from a hygienic point of view or have toxicological impacts in the final superabsorbent products.

A typical specification for purity and main impurities of acrylic acid used as a raw material in the production of superabsorbent polymers is as follows:

Appearance	Transparent Liquid
Purity	99.8 wt. % min.
Color (ALPHA)	10 max.
Water content	500 ppm max.
Content of Inhibitor	180-220 ppm
Dimer of acrylic acid	1200 ppm max.
Propionic acid	300 ppm max.
Acetic Acid	1000 ppm max.
Furfural	22 ppm max.
Benzaldehyde	1 ppm max.
Heavy Metals (as Pb)	2 ppm max.
Iron Content	5 ppm max.
Arsenic Content (as As ₂ O ₃)	2 ppm max

This is confirmed by the enclosed sheet "BASF Superabsorbent Materials, Raw Material Purchase Specifications and Requirements" of April 14, 2000. Further purification will dramatically increase the costs of acrylic acid and thus the costs of superabsorbent production. In practice, the total content of acetic acid and propionic acid will range from 800 to 1100 ppm.

Turning back to Irie et al., it is stated in col. 8, line 57 to col. 9, line 7 and also col. 19, line 1 to col. 20, line 45 to refine acrylic acid by distillation, then, within a short period of time, to neutralize the acrylic acid at low temperature and to subject the neutralized acrylic acid as soon as possible in order to achieve a low concentration of β -hydroxy propionic acid. While the concentration of β -hydroxypropionic acid can be simply reduced by distillation of acrylic acid, it is not possible to reduce the concentration of propionic acid and acetic acid that way, because propionic acid has a boiling point of 141°C which is identical with the boiling point of acrylic acid and acetic acid has a boiling point of 118° which is rather close to the boiling point of acrylic acid. Therefore, the reduction of the total concentration of acrylic acid and propionic acid in acrylic acid to a ppm range requires more elaborate purification techniques than the simple

distillation techniques. This is confirmed by comparative example 3 of application Serial No. 10/511,603, where acrylic acid was purified by distillation. The distillation produced acrylic acid that contains 1200 ppm of acetic acid and 300 ppm of propionic acid which is more than 3 times higher than the required maximum level according to the present invention.

6. The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

7. Further deponent saith not.

Ludwigshafen March 30, 2007

Rüdiger Re

BASF SUPERABSORBENT MATERIALS RAW MATERIAL PURCHASE SPECIFICATIONS AND REQUIREMENTS



Raw Material:	ACRYLIC ACID	Date Issued:	April 14, 2000
Specification #:	0320-00-1.1(S)	Revision #:	001
Product CAS #:	150-76-5	Previous Rev. Date:	April 16, 1999
Using Location:	Portsmouth, Virginia	Review Frequency:	Annually
Qualified Supplier:	Celanese Corp. (Clear Lake, Texas) BASF, Rohm & Haas	Date Last Reviewed:	March 30, 2000
Product Information:	HySorb Products		

Purchase Specifications:

Analysis	Grade/Type	Specifications	Analytical Method
Acrylic Acid	"Low Dimer" Glacial		
Appearance		Transparent Liquid	0320-00-1.1.1
*Purity		99.8 wt.% min.	0320-00-1.1.2
*Color (ALPHA)		10 max.	0320-00-1.1.3
Water Content		500 ppm max.	0320-00-1.1.4
*Content of Inhibitor		180 - 220 ppm	0320-00-1.1.5
*Dimer of Acrylic Acid		1200 ppm max. (as received)	0320-00-1.1.2
*Propionic Acid		300 ppm max.	0320-00-1.1.6
*Acetic Acid		1000 ppm max.	0320-00-1.1.6
*Furfural		22 ppm max.	0320-00-1.1.6
*Benzaldehyde		1.0 ppm max.	0320-00-1.1.6
*Heavy Metals (as Pb)		5 ppm max.	0320-00-1.1.7
*Iron Content		2 ppm max.	0320-00-1.1.8
*Arsenic Content (as As ₂ O ₃)		2 ppm max.	0320-00-1.1.9
PTA		1 ppm max.	0320-00-1.23.10
Light Ends		2 ppm max.	0320-00-1.23.11
Polymer Qualitative		1 ppm max.	0320-00-1.23.12

NOTE: Any individual unspecified component which exceeds 0.1 wt.% must be reported to Section Leader, Product/Process Development, Superabsorbent Materials for shipment release.

Certificate of Analysis (COA)

A COA must be faxed in advance of all shipments. COA's for each lot/batch shipped must contain the following:

- Analytical results for all * specifications.
- Shipment container or lot/batch identification number.
- Our Purchase Order Number.

COA's are to be directed to:

Attention: Quality Office

Telephone #: 757/483-7371 Fax #: 757/483-7415

Buyer reserves the right to require a sample of material produced under changes in manufacturing location, technology or product specifications for approval, before shipment. Methods of analysis will be requested should an out of specification condition arise.